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Original Research Article

Pattern and Outcome of Preterm Neonates Admitted in a Tertiary Health Institution in Nigeria

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Abstract: ***Background***: Prematurity is a common but understudied cause of neonatal admissions and mortality in Nigeria. This study aimed to determine the pattern and outcome of premature neonatal admission in a southwestern institution in Nigeria. ***Methods***: The study was a retrospective study conducted among twenty-eight preterm neonates admitted to the special care baby unit between December 2024 and July 2025. Sociodemographic data of mothers and clinical details of neonates were extracted from their case notes. Data obtained were analyzed using SPSS v25. ***Results***: The 28 premature neonates that were studied aged between 1 hour and 23 days at admission. Five (17.9%) had estimated gestational age less than 28 weeks, 12 (42.8%) between 28 - 31 weeks and 11 (38.3%) between 32 - 36 weeks. Eighteen (64.3%) were delivered per vagina and 10 (35.7%) by caesarian section. Birth weights ranged between 0.82 – 3.00kg. Ten (35.7%) preterm deaths and 2 (7.1%) maternal deaths were recorded among the 28 neonates. Preterm deaths were more significantly associated with maternal mortality. (P = 0.04). ***Conclusion***: Prematurity is a significant cause of admission and death in the neonatal age group. Strategies and interventions to prevent preterm deliveries and death need to be engaged urgently in both the management of premature babies and their mothers.

Keywords: Prematurity, Neonatal mortality, Preterm birth, Maternal mortality, Special Care Baby Unit, Nigeria, Gestational age.

INTRODUCTION

The neonatal age group is a significant contributor to both under five morbidity and mortality globally. Nigeria is known to have the highest neonatal mortality rate [1]. Prematurity is one of the notable causes of neonatal admission and mortality in developing countries [1, 2]. Several interventions have been suggested to reduce the prevalence of premature admissions such as management of preterm infections and reduction of maternal stress, but this has not produced a significant change, even during periods of restriction and lockdown [2].

The continued contribution of prematurity to neonatal mortality is an important reason to update research on this subject. Some issues that have been documented to be associated with survival of premature babies viz a viz improved resuscitation practice and available, advanced neonatal support [2, 3]. Additional factors documented to affect outcome in the premature infants include comorbidities like asphyxia, congenital anomalies and co-infection [4, 5].

The prevalent factors responsible for delivery of premature babies and associated complications differ from locality to locality. Thus, it is important to identify comorbidities and co-infections associated with prematurity and factors that may be responsible for death in different settings. Thus, this study evaluates the pattern and outcome of preterm babies including factors responsible for prematurity and mortality of preterm neonates at the neonatal unit of LAUTECH Teaching Hospital, Ogbomoso. Nigeria.

METHODOLOGY

Study Design

This was a retrospective study conducted among neonates admitted to the special care baby unit of LAUTECH Teaching Hospital Ogbomoso Nigeria between 1st of December 2024 and 31st July 2025.

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Study Criteria

Babies born prematurely (before the completion of 37weeks gestational age) were studied. The gestational age of the babies was calculated based on the assumption that conception was the first day of the last menstrual period or by ultrasound dating when mothers were unsure of dates.

Study Procedure

Maternal biodata and neonatal clinical history were extracted from the records. These include the socio-demographic details, age at delivery, mode of delivery, indication for premature delivery, age at admission, indication and duration of admission, associated complications and outcome.

Anemia was defined as packed cell volume below 45% in the first week of life. A random blood sugar below 3mmmol/L was defined as hypoglycemia and an axillary temperature below 36.5^{o}C was defined as hypothermia. Neonatal sepsis was diagnosed, based on abnormal clinical findings, positive blood culture, a raised micro ESR, Procalcitonin or C-Reactive protein.

The social class of the baby was based on Oyedeji's socioeconomic classification based on computing the educational attainment and occupation of the parents [6]. The educational grouping were divided into five and alloyed into group I for tertiary educational training viz a viz university and postgraduate training, sub-tertiary into group II viz a viz National diploma and equivalent, Group III secondary and technical school and training, while group IV consisted of primary school equivalent training and group V was those with no formal training.

Occupational training was divided into five groupings. Group I consisted of highly skilled workers such as doctors, engineers, computer specialist, university lecturers and banker. Group II consisted of skilled workers majorly without tertiary training like nurses, secondary school teachers. Group III consisted of medium traders. Group IV consisted of artisans and equivalents, while group V consisted of housewives and unemployed individuals. The socioeconomic class of the baby was the addition of the groupings for the educational and occupational status for both mother and father divided by 4. Parents in group I and II were classified as upper socioeconomic class and group III as middle and group IV and V as lower class.

Data Analysis

Data obtained from the extracted information were inputted into Statistical Product and Service Solutions version 25 [7]. Continuous variables were analyzed to give means and range for the age of the children and categorical data was analyzed to test for proportions and significance using Chi-square, and P-value was set as significant at levels below 0.05.

Ethical Approval: Not Applicable.

RESULTS

A total of 28 premature neonates were admitted to the special care baby unit over the 8 months period of the 129 overall neonatal admission within the studied duration representing 21.7% of the total neonatal admissions. Age of the preterm admissions ranged from 1 hour to 23 days with a mean of 2-71 ± 7.46 days. Of these 28 admissions 16 (57.1%) were males and 12 (42.9%) females giving a male to female ratio 1.3 :1.

The gestational age of the neonates ranged from 26 – 34 weeks. Five (17.9%) were extremely preterm (less than 28 weeks gestational age), 12 (42.8%) very preterm (28 to less than 32 weeks gestational age), and 11(38.3%) moderate preterm (between 32 to 37 weeks gestational age). Birth weights ranged between 0.82 – 3.00 kg, mean birth weight was 1.49 ± 0.6 kg. Six (21.4%) neonates were extremely low birth weight (less than 1.0 kg) while 15 (53.6%) were low birth weight (less than 2.5 kg), and 2 (7.1%) had normal birth weights (2.5-4.0 kg).

Of the 28 deliveries majority 19 (67.9%) were inborn. The other places of delivery were Private hospitals, State General hospital and Maternities in 6 (21.4%), 2 (7.1%) and 1 (3.6%) case, respectively. More so, 18 (64.3%) were per vagina and 10 (35.7%) were through emergency cesarian sections, Table 1.

Table I: Neonatal frequency and distribution details

Variables	Categories	Frequency (%)	Mean ±SD
Age	1hr – 23days		2.71 ±7.46
Sex	Male	16(57.1)	
	Female	12(42.9)	
Gestational Age	<28 weeks	5(17.9)	
	<32 weeks	12(42.8)	
	<37 weeks	11(38.3)	
Birth weight	0.82 – 3.00 kg		1.49 ± 0.6 kg
	<1.0kg	6(21.4)	
	<2.5kg	15(53.6)	
	<4.0kg	2(7.1)	
Place of Birth	Inborn	19(67.9)	

Variables	Categories	Frequency (%)	Mean ±SD
	Out born	9(32.1)	
Mode of delivery	Vaginally	18(64.3)	
	Cesarian section	10(35.7)	

The indications for the cesarian section were eclampsia in 5 (50.0%), fetal distress in 3, (30.0%), oligohydramnios and intrauterine growth restriction in 1 (10.0%), and poor progress and cervical stenosis in 1(10.0%). Indications for premature delivery include prolonged rupture of membrane 8(28.6%), spontaneous onset of preterm labor 7(25.0%), eclampsia 4(14.3%), antepartum hemorrhage 3(10.7%), maternal infection 3(10.7%), fetal distress 1(3.6%), poor progress and cervical stenosis 1(3.6%) and oligohydramnios and intrauterine growth restriction 1(3.6%).

Neonatal sepsis was the most common indication for admission with ten of the preterm being diagnosed with neonatal sepsis. Five (50.0%) of the ten cases of neonatal sepsis had blood cultures bacterial isolates. *E coli* was isolated in 2 and it was sensitive to pefloxacin, streptomycin, ofloxacin, gentamycin and amoxicillin. Another two cases had isolates of *Klebsiella pneumoniae* sensitive to Ampicillin, Levofloxacin and Amoxicillin + Clavulanic acid (Augmentin). The last bacteria isolate was coliform group of organisms. Neutrophilia was recorded in two cases and a Micro ESR of 15mm/hour in a case, apart from other clinical findings like fever or hypothermia, anemia and respiratory distress, Table II.

The duration of admission ranged from 1 hour to 80 days with a mean of 16.21± 3.93 days. The total number of preterm babies discharged in healthy good condition was 18 (64.3%), while 10 (35.7%) died. The causes of death among the 10 were respiratory distress syndrome in 6(60.0%), severe birth asphyxia in 2 (20.0%) sepsis in 2 (20.0%). Two of the neonates with respiratory distress syndrome also had neonatal sepsis co-infection.

Table II: Indications for admissions in the preterm neonates

Clinical indication	Frequency (%)
Neonatal Sepsis	10(35.7%)
Respiratory distress syndrome	6(21.4%)
Neonatal jaundice	5(17.6%)
Anemia	4(14.3%)
Birth asphyxia	2(7.1%)
Hypoglycemia	1(3.6%)
Unidentified syndromic disease	1(3.6%)
Hypothermia	1(3.6%)

Mothers age ranged between 18 years and 39 years with a mean of 29.53 ±5.71 years. Of the 28 mothers, 11 (39.3%), 11 (39.3%), 4 (14.3%) and 2 (7.1%) had tertiary institution equivalents, secondary education equivalents, primary school education and no formal education, respectively. More so, than half of the mothers were seamstresses and housewives. Of the 28 mothers, 8 (28.6%) were seamstresses, 8 (28.6%) housewives, 4 (14.3%) were petty traders, 3 (10.7%) teachers in secondary and primary schools and 2 (7.1%) were hairdressers. The occupations of the 3 (10.7%) remaining mothers were selling cheese, baker and medium grade trader.

Table III: Maternal Socio-demographic Distributions

Variables	Categories	Frequency (%)	Mean ±SD
Age	18 – 39 years		29.53 ±5.71
Level of Education	Pry	4(14.3)	
	Secondary	11(39.3)	
	Tertiary	11(39.3)	
	None	2(7.1)	
Occupation	Seamstress	8 (28.6)	
	Housewives	8 (28.6)	
	Petty trader	4(14.3)	
	School teachers	3(10.7)	
	Hairdressers	2(7.1)	
	Others	3(10.7)	

Of the 28 mothers, 2 (7.1%) died peri-natally. Two (100.0%) deaths were recorded among mothers that died at childbirth compared to 8 deaths among the 26 mothers that are alive. $X^2 = 3.88$, $P = 0.04$. Regarding the

socio-economic statuses of the mothers, 2 (7.1%) were in the upper, 21 (75.0%) in the middle class and five in the lower socioeconomic class. No deaths were recorded in the upper social classes, while the 10 neonatal deaths were recorded among the 26 lower classes $X^2 = 1.20$, P = 0.27. (Table IV)

Most of the neonatal deaths occurred in the moderate preterm category, with 5 (83.3%) out of 6 deaths recorded among the group and two thirds of death recorded in the extremely preterm category. However, there was no significant difference in the proportion of mortalities across the groups (table IV).

There was no mortality among the neonates with birth weights above 2.5 kg compared to other age categories that recorded mortalities. However, the differences in association were not significant (table IV).

Table IV: Association between outcome and some preterm and maternal characteristics

Variables	Died (10)	Survived (18)	X^2	P value
EGA				
Extreme preterms (<28weeks)	2	3	1.10	0.58
Very preterms (28 - 31 weeks)	3	9		
Moderate preterms (32 - 36wks)	5	6		
Birth weight				
< 1kg	3	5	3.38	0.34
1 - < 1.5kg	2	7		
1.5 - < 2.5kg	5	4		
> 2.5kg	0	2		
Social class				
Upper	0	2	1.20	0.55
Middle	8	13		
Lower	2	3		
Maternal well being				
Alive	8	18	3.88	< 0.05
Dead	2	0		

Treatment modality and Outcomes

Of the 28 mothers 13 (46.4%) received corticosteroids pre-delivery while 15 (53.6%) did not. Of the 15 that did not receive corticosteroids, 5 deaths were recorded, and this accounted for 50.0% of the total deaths. However, all the 28 premature babies did not receive corticosteroids. Twenty-two (78.6%) babies received CPAP administration at birth. The six (21.4%) babies who did not receive CPAP administration at birth had a gestational age of 32 weeks and above. In addition, they were not in respiratory distress. One death was recorded in one of the preterm in the above aged 32 weeks gestational age category.

DISCUSSION

The present study has reported the pattern of preterm admissions and their outcomes at a Southwestern Teaching Hospital in Nigeria. The results obtained from this study is comparable to similar studies in Nigeria [4-9].

Neonatal sepsis, respiratory distress syndrome and neonatal jaundice were the most common clinical conditions diagnosed in our series. The low birth weight, the very low birth weight, and the extremely low birth weight predominated our series for weight category admission with the minority of the admissions weighing above 2.5 kg. Our finding on the admission characteristics or indications for admission in the present series compare similarly to previous studies [1-10].

The major causes of premature delivery in the present study were prolonged rupture of membranes, spontaneous onset of labor, antepartum hemorrhage, and eclampsia. Some of the reasons for preterm deliveries in our setting are like that in England.[11] Globally our results compare fairly with previous studies [10-12]. Maternal intra-partum disease can give rise to maternal morbidity and mortality [10-14]. Two maternal mortalities were recorded in the present series from eclampsia. Preventing maternal mortality is very important as it is a significant determinant of neonatal survival and overall wellbeing of the delivered child in life.

Our finding of no significant association between estimated gestational age, birth weight and peri-natal outcomes are both consistent and inconsistent with previous studies [8-16]. Possible reasons that may explain our results may have to do with our small sample size, as the results may have differed with a more robust sample size. In addition, the comorbidities in the majority of our patients make it impossible to obtain the association of a single factor on outcome as the comorbidity may be a confounder.

The lack of association with the maternal socioeconomic status also is not expected. Previous reports show that maternal education impacts positively on wards outcome [15, 16]. However, another study showed no association between maternal social status and neonatal outcome [17]. Again, we suggest our small

sample size to account for inability to obtain the significant association.

The causes of death in our series were majorly respiratory distress accounting for more than half of the deaths recorded among the subjects. In order to effectively reverse this trend, there is a need to prevent delivery of preterm neonates and engage with interventions that may mitigate the tide of the disease. Result from the present study show that more than half of the studied population failed to receive corticosteroids. In addition, none of the studied population received surfactant primarily because it was expensive and secondly not easily accessible. Thus, the outcome could have been better as available evidence show that these two interventions impact the outcome of RDS positively [18-20].

Neonatal sepsis and asphyxia accounted for the remaining cases of deaths among our studied population. Both conditions are preventable to an extent and can be better managed if the standard of care of the preterm infants and mother in pregnancy and delivery are optimum.

The weakness of this study is the small sample size which makes generalization unrealistic or poor. However, the study was well researched as there were adequate personnel to manage the patients well and conduct the research. Better planned studies are suggested on this topic to uncover any remaining knowledge gap.

CONCLUSION

Premature delivery remains a major cause of morbidity and mortality in neonates worldwide. Premature prolonged rupture of membranes, spontaneous onset of preterm labor, eclampsia, antepartum hemorrhage, maternal infections, and intrauterine growth restriction are major factors associated with preterm delivery. Strategies and interventions to reduce the delivery of preterm babies and post-natal care to prevent complications to improve the outcome of preterm births require urgent implementation.

Statements and Declarations
Funding: The study did not receive any funding from the government or not-for-profit organization.

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Conflicts of Interest: The authors declare no conflict of interest.

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